## TRANSLATION LINKS

1. type into your browser ... **english+italian+glossary+nautical terms**
2. utilise the translation dictionary 'Nautical Terms & Expressions' from Euromodel website

# An *interpretive* review of the Derfflinger

## 17C Dutch Fluyt

**1675**

**Scale 1:80**

**Checked the *Essential* Resource Information File ?**

# 03.HULL CONSTRUCTION

**July 2020**

**This *interpretive* build is based on the supplied drawings, the kit material – and an amount of extra material.**

***This work only illustrates how this ship might be built.The level of complexity chosen is up to the individual***

This interpretive information was based on the original text supplied by Euromodel and then expanded in detail as the actual ship was constructed by the author, Peter Coward. Neither the author or Euromodel have any commercial interest in this information and it is published on the Euromodel web site in good faith for other persons who may wish to build this ship. Euromodel does not accept any responsibility for the contents that follow.

# *This is **NOT** an instructional manual but illustrates my own interpretation based on the drawings and the supplied kit.*

- Additional material used was dictated by my own personal choices.
- Greater simplification would be achieved by using the material as it is supplied.

**Plan Sheets 1, 3 and especially 5 were used for the *base references*. If there was any question about other drawings, it was these three that were kept in mind.**
**Plane Sheet 5 contains the detailed scratch-build drawings upon which this kit is based.**

## Reference Text

***Historic Ship Models*** by Wolfram zu Mondfeld (1989)
***Seventeenth Century Rigging*** by R.C. Anderson (1955) [almost a complete copy of his earlier book ***The Rigging of Ships in the Days of the Spritsail Topmast, 1600 – 1720*** (1927) ]
***The Construction and Fitting of the English Man of War 1650-1850*** by Peter Goodwin (1984)
***The Masting and Rigging of English Ships of War 1625 – 1860*** by James Lee (1984).

*[To navigate through the contents – use 'control + click']*

# Contents

# Illustrations

# CHAPTER 1: GUNPORTS

## Shape

The gunports were generally rectangular but there was some variation within this geometric shape … the vertical sides, following the frames, *would always be perpendicular to the keel* but the upper and lower sills followed the planksheer curvature creating a slight parallelogram. On a large ship with largely flat decks, this would not present a problem except where the deck curves upwards at either end.

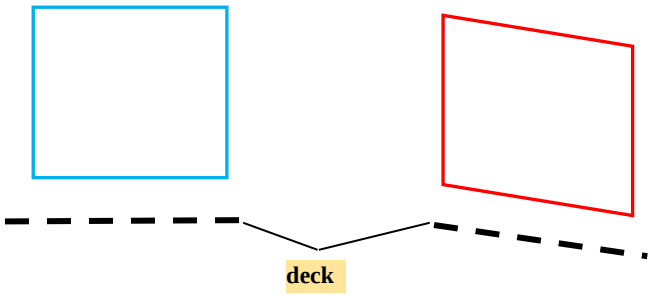



**Figure 1: Planksheer and the Timber Sills**

On smaller ships, this curvature would be more accentuated. Many model ship plans may not include this finer point and so all ports are drawn as square/ rectangular. As Fig. 1 shows, a distinct planksheer curvature will cause the upper and lower timber sills to be angled. Whether the builder wishes to follow this principle is another question.

There are debates and arguments over the fitting of the gunport lid into the hull surface when closed and the complementary arrangement of timbers around the gunport opening. In the end, there has to be a compromise depending on both the skill and the interpretation of the individual builder.

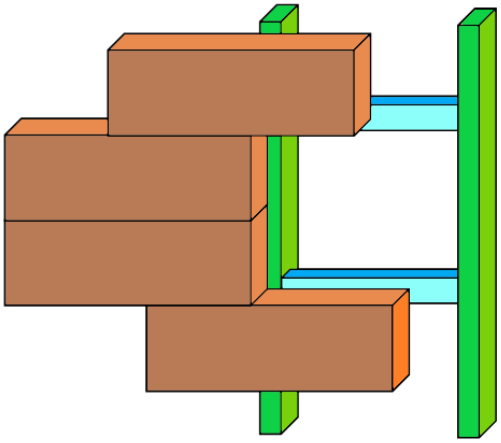


**Figure 2: Gunport (diagrammatic)**

The following description I found some time ago but cannot exactly reference ….

… the typical *rectangular* gunport was formed from two vertical ship's frames (green) and an upper and lower horizontal sill timber (blue).

The strakes were so arranged to form a partial overlap of the four gunport timbers. From my observations, the majority of ports tend to be rectangular rather than square.

The lid will fit in the recess and therefore be *flush with the exterior hull surface.*

# Dimensions

Some builders choose to have ***all gunports in the closed position*** which means that there are no visible guns – assuming that there are none to be found on the open main or quarter decks.

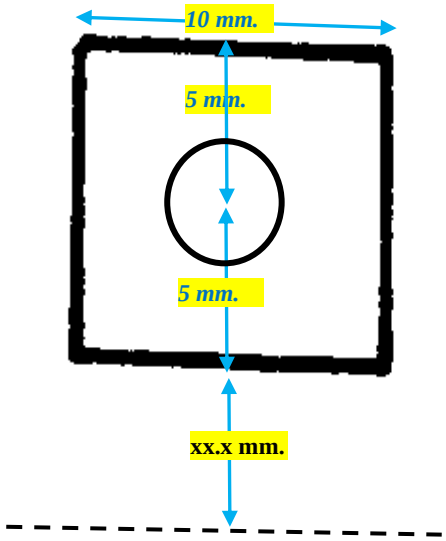



**Figure 3: Cutting the Main Deck Gunport**

There were large variations in gunport openings in Plan Sheet 1 and the size was settled on as ***8 x 8 mm*** obtained from Plan Sheet 4.

Having constructed the gun carriages, cannons were mounted onto them (without fixing) to determine the cannon height above what would be the deck surface. The height above the deck is shown in Fig. 1 as ***xx.x mm*** but that depends very much on the carriage construction carried out by each builder. Even with great care, there was still a *small variation between individual carriages*.

N.B. In the much enlarged gunport diagram, the dark, thick outline does *not* represent the frame thickness – just shows the opening.

***Depending on which of the following two methods of constructing the gunport frames***, the gunport cutout will be either …

- ***Drawing : 10 mm.*** high x ***10 mm.*** width (allowing 1 mm. thickness of frame) – Fig. 3 dimensions.
- ***Suggested Modification: 12 mm*** high x ***12 mm.*** width (allowing 2 mm. thickness of frame)

In both cutout scenarios, the final dimensions with frames included will be ***8 mm.*** high x ***8 mm.*** width. The two approaches are described below.

**Figure 4: Gunport Lining Strips Set Back**

## *A simple approach to constructing the gunport frame …*

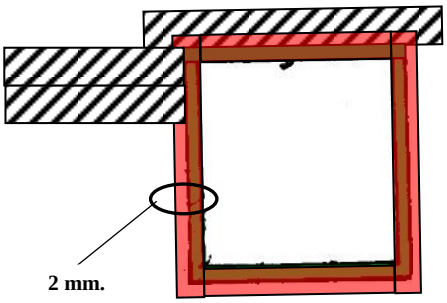
The exposed frame as just described can be replicated using short inserts from planking material and set in slightly from the hull surface. Having said that, some will just make them flush with the hull surface. Given that the total hull thickness is not great, *the tendency will be to go flush* to enable those replicating strips to be fixed satisfactorily against the cut-out surfaces.

*A more detailed approach to constructing the gunport frame …*

**Figure 5: Gunport Frame Added to First Planking**

Sills and 'frames' can be constructed from ***2 x 2 mm*** timber pieces which are fixed in place flush with the first planking. Obviously, the original ***gunport cutout will need to be larger*** to allow for the extra thickness of the framing. The completed frame can then be coloured with, for example, a dark red paint.

The second planking can then be added, covering just 1 mm. of the 2 mm. width (Fig. 6). With a *larger cut-out*, this still retained the 8 x 8 mm. opening surrounded by an exposed timber lining thickness of the intended 1 mm.




**Modified Drawing**
**8 x 8 mm. port + 2 mm. sills & 'frames'**
**= 12 mm. x 12 mm. cut-out**

**Figure 6: Modified Gun Deck Gunport Size**

**Figure 7: Gunport Sanding Stick**

In this build, the four pieces forming the 'frames' & sills were added individually but even with the most meticulous measuring, the final opening needed some sanding/ filing to form the 'perfect' ***8 x 8 mm.*** form. Fig. 7 shows a sanding stick with an overall cross-section of ***7.7 x 7.7 mm.*** (allowing for insertion into gunports that were slightly smaller than the nominal 8 x 8 mm.

## Quarter Deck Guns

Per side, the drawings show two guns on the quarter deck – one inside (red-dashed circle) under the poop deck and one out on the open quarter deck (yellow).

The positioning of guns out on the quarter deck would have been logistically difficult with the narrow deck space restricting recoil after firing along with the members of the gun crew and the proximity of the large grate.

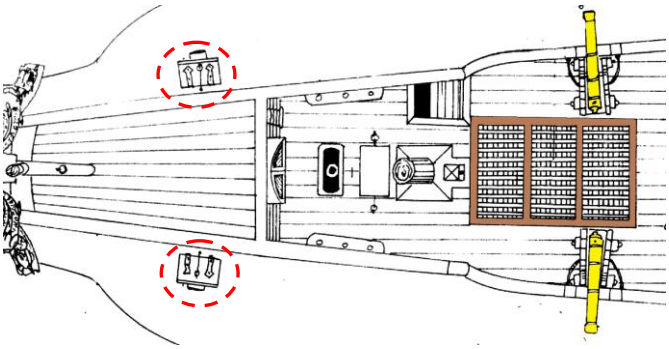


**Figure 8:Quarter Deck Guns**

**Figure 9: Grate Covers on the Batavia**

Larger fluyts such as the *Batavia* overcame this problem where, on lower decks, temporary covers were placed over the grates when gun action was required. On a smaller fluyt, such an action would just add to the difficulty already encountered on the crowded quarter deck.

There is also another mystery regarding the guns – each would normally take 4-5 men when in action but this ship operated with a fairly small complement of around 20 men in total.Apart from the crowded space on the open quarter deck, there is also the question of adding too much weight high up on this narrow-profile ship leading to general instability.

**Figure 10: Guns on the Open Quarter Deck**

For the above reasons, it was decided to ignore the original intent from the Euromodel drawings in the belief that such guns did not exist. However, there has been some discussion on MSW forum suggesting that in times of warfare, extra guns may have been added as a temporary measure.

In this build, these two guns were omitted. After all, this was a commercial, cargo carrying ship and its design gave it a valuable safety factor of speed as a significant defensive factor. Its crew was relatively small and g

Fig. 10 well illustrates the crowded nature of such guns on this build of the Euromodel Derfflinger.

From the following link …

https://www.modelships.de/Fluyt-Zeehaen/Photos-ship-model-fluyt-Zeehaen.htm

… are some published images of a completed model of the fluyt, Zeehaen (1634).

**Whether this was also typical of the Derfflinger is up to debate.**

Seen here is what would be expected of a small commercial ship – a small number of guns on a ship that depended on speed to evade unwanted action.

**Figure 11: Limited Armament on the Small Fluyt, Zeehaen**

**Figure 12: Poorly Positioned Guns and Lids**

*The following text relating to the main capstan is given for general interest and in no way implies inclusion for this kit build.*

# CHAPTER 2: UTILISING THE MAIN CAPSTAN

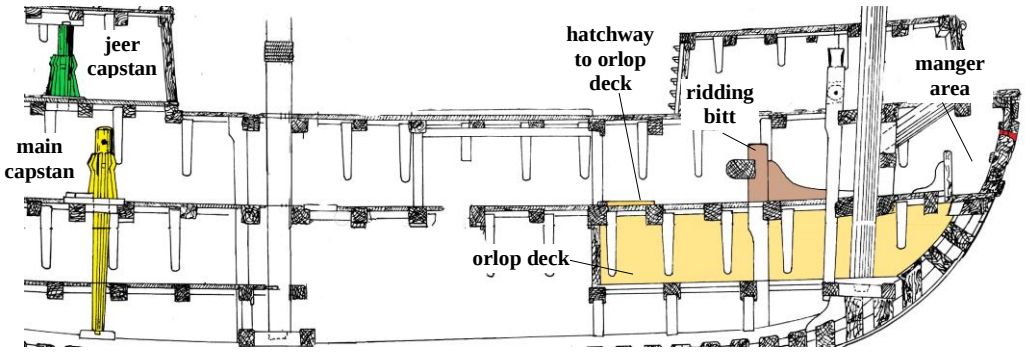



**Figure 13: Two Capstans**

The function of the main capstan (Fig. 13, yellow) is to operate the anchor cable. To haul in the cable, a 'messenger' rope system (red arrows, Fig. 14) was used. The large anchor cable was temporarily attached to the messenger rope via a number of nipping ropes tying the two together. As a nipping tie approached the hatchway through which the cable was passed down (purple arrow) onto the orlop deck, a team was engaged to untie the nipping and then run it back to the forward end where the cable was meeting the messenger rope. A new tie was made and that was followed along by each person in turn.

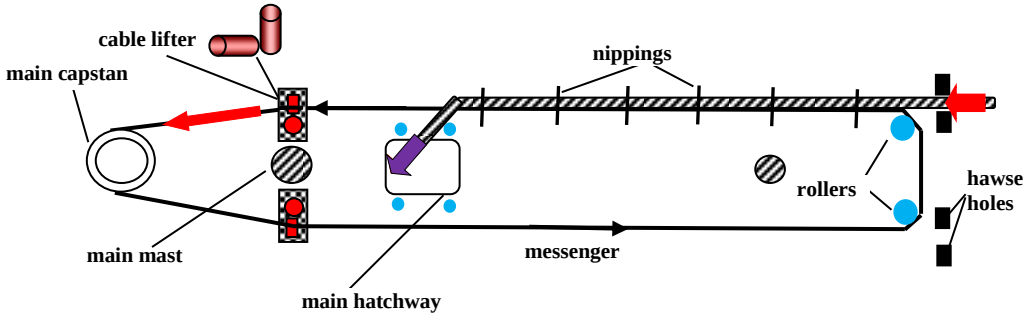



**Figure 14: Messenger System on Orlop Deck**

## Messenger Cable

Fig. 14 is diagrammatic but portrays the essentials of the messenger cable system used to haul in the anchor cable.

- A few of the rollers that enabled the smooth flow of the cable through the hatchway are indicated by blue dots but there are more rollers included within the hatchway space as well as on the orlop deck itself.
- Approx. four turns of the messenger cable were passed around the capstan barrel and that was kept at the correct height by a pair of ***cable lifters*** fitted with both horizontal and vertical rollers (refer to Fig. 14 above).
- Essential to the smooth flow of the anchor cable itself were a pair of large, vertical rollers (brown) contained in the manger area (red) immediately adjacent to the hawseholes (Fig. 14).

## Manger

- The manger was a short bulkead wall fitted transversely across the deck to prevent any sea water that came through the hawseholes from passing down along the full length of the orlop deck as well as collecting water that drained from the anchor cables as they were hauled inboard. Also a convenient place to keep live cattle.

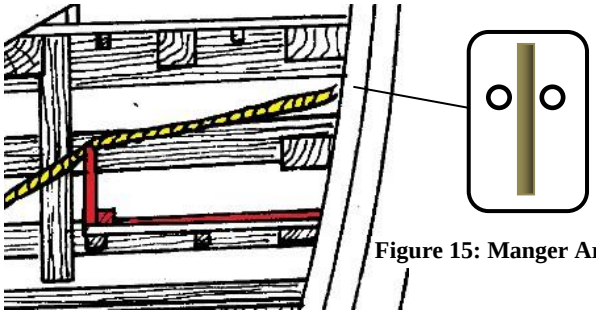


**Figure 15: Manger Area**

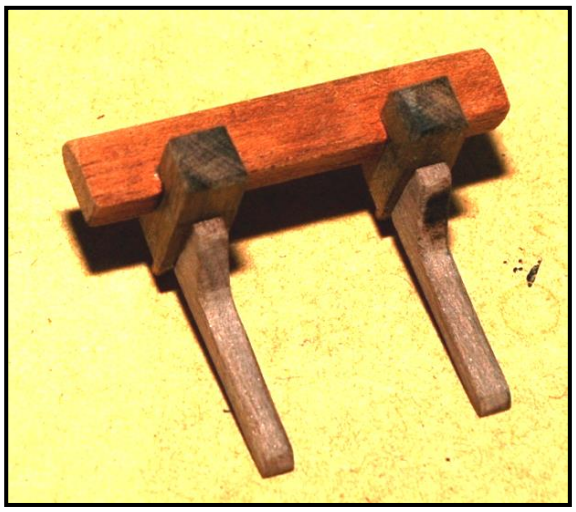


**Figure 16: Typical Ridding Bitt Construction**

## Ridding Bitt

Located on the gun deck, the bitt was designed to take the strain of the anchor cables when riding at anchor. The bitt pins consisted of vertical timbers passing through at least two decks and secured with clench bolts to deck beams at each level. The uppermost section projected several feet above that deck fitted with the hawse holes where the cables were taken in.

Each pin was reinforced by both a large standard (inverted knee) and a thick horizontal cross timber connecting the two bitts on the aft side. This timber projected out on both sides past the vertical bitts.

# CHAPTER 3: HULL STRUCTURE, Part 4

## Planking and Wales

### Straight or Curved Planks

The fluyt design typically had an additional layer of ***clinker-planking*** over the upper portion of the hull and that is readily seen in the drawings. What can also be seen from the drawings is that *all* of the planking is ***curved***.

However, from the builds of the Derfflinger observed, it seems not uncommon to simply go with non-curved planks. This makes the whole process so much easier and I guess the end result is not too un-attractive, even if it ignores the historical accuracy. Fig. 18 illustrates this point.

**Figure 17: Straight and Slightly Curved**

**Figure 18: Wale Separation can be Difficult**

Fig. 19 shows another model with straight planking. It also illustrates the *difficulty that can be experienced in creating the correct curvature and separation for the lower stern wales.*

Fig. 20 shows that the correct wale separation can be achieved.

**Figure 19: Better Wale Spacing**

Many builders like to lay the wale strips *over* the second planking in such a way that there is no overlap with the gunport openings. At the time the Derfflinger was built, there were intersections that required some cutting in to maintain the gunport opening.

*The following comments on the sheer profile may be a little academic but serve to illustrate a problem that the shipbuilders of that time had. Whether the builder of this model chooses to add the second planking in a curved or straight fashion, the placement of the wales over them bears some thought.*

## Sheer

The sheer is a measure of the longitudinal main deck curvature and in the Derfflinger the degree of sheer is greater aft than forward. It helps build buoyancy of the ship by increasing its volume and also serves, by its increased height, to reduce the amount of sea water coming on to the deck at each end.

### Sheer vs. Planking

The planking of a ship will follow the sheer and it is important that this rule be followed if accuracy is important to the builder.

### Sheer vs. Wales

The *wales curve upwards more sharply than the sheer of the ship and since the decks generally followed the sheer, the wales at some points intersect the gunports*. This was not at all uncommon and led to a weakness in the wales and it was quite some time before this problem was overcome.

Whilst the curvature of the wales does not follow the overall deck sheer, the spacing between any two wales is generally consistent along the ship.

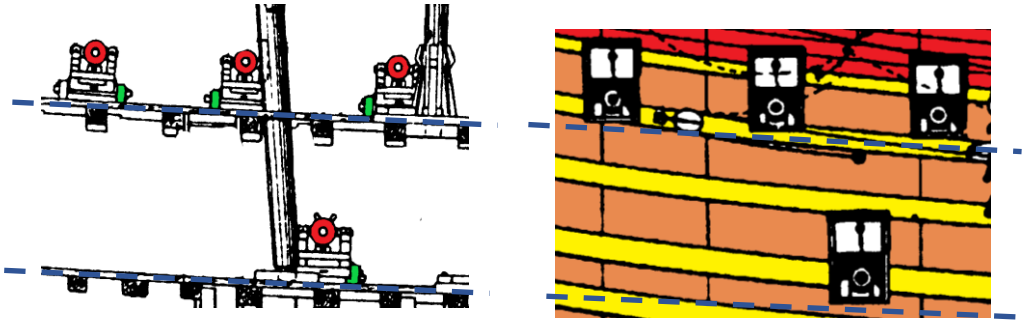


**Figure 20: Disparity Between Sheer and Wale Alignment**

Fig. 21 does not outline the positioning of individual planks (brown) but their alignment as stated above will follow the sheer profile.

The wales were there to add strength to the overall hull and so their placement on the hull surface was more in relation to the overall shape rather than the sheer. In this Derfflinger build, there should be no concern that an intersection occurs between the gunport openings and the wales as it does typify what happened in the actual build of many actual ships of this time era.

*Historically, the number and placement of these wales changed in order to reduce these gunport intersections but that need not be discussed in this review.*

## Wales

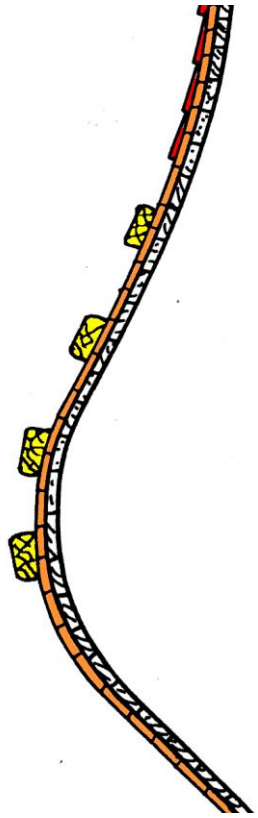


**Figure 21: Wales and Planking**

There are two things to keep in mind here – the Derfflinger is a small ship and it is a Continental build. There will be some features not applied to the usual construction methods of larger English ships. This is a review of the drawings as presented.

After the first planking is completed, the following features are addressed and shown in Fig. 22…

1. **second planking** (brown) added over the entire first planking,

2. **wales** (yellow) added ***over*** the second planking
   [historically, the larger ships would have the thicker wales fixed to the frames first and then the normal planking added between them. That is not the case here and is illustrated in Fig. 18]

   Whilst the uppermost of these wale strips follows the sheer profile in the waist of the ship – and could be referred to as the planksheer – it does not do so forward and aft. It was decided to refer to this only as a wale. This then fits in with a common practice of having an upper pair of wales that had a wide separation with a lower pair, closer together.

3. **clinker planking** (red) also added *over* the second planking

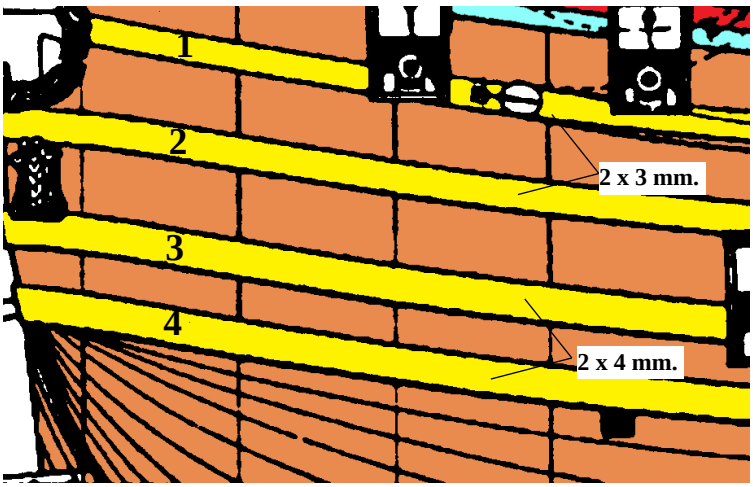



**Figure 22: Wale Interpretation**

### Interpretation

The kit initially supplied timber strips for only the two lowest wales, 3 and 4 (2 x 4 mm.).

Later kits will contain material for the other two wales 1 and 2 (2 x 3 mm.).

## Profiling

Since the drawings show the second planking being added first, the wales will need to be fixed over them and the strong curvature at the stern will demand some close attention.

It would be difficult to create an off-ship jig to recreate the total profile of each wale so it was proposed to use the hull itself but this would not allow the use of clamps that would need to be screwed into the second planking itself.

The solution was as follows …

- All eight wale strips were soaked in dilute ammonia solution (‘household ammonia’ or ‘cloudy ammonia’) for at least 7 days and by this time the timber was ***very*** pliable. Fig. 24 shows a 900 mm. section of PVC pipe sealed at the bottom end. The timber strips were inserted into the ammonia solution-filled tube and the open end closed over with a tight-fitting cap (plastic drink bottle was used).

**Figure 23: Soaking in Ammonia**

- lines were drawn over the first planking to identify the four wale positions on each side.

# Second Planking

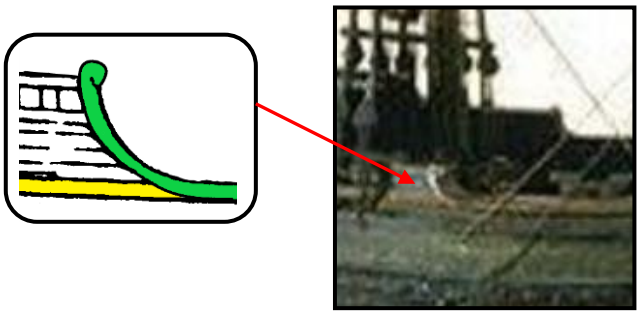


**Figure 24: Wale 1 Discontinuity**

## Wale 1 Positioning

A 2 x 2 mm. wale was added using some extra timber not supplied (those who do not have this particular sized timber could just start with a plank in place of this wale).

It should be obvious from Fig. 25 that the wale continuity along the hull length is interrupted by the bulwark hances (curved bulwarks).

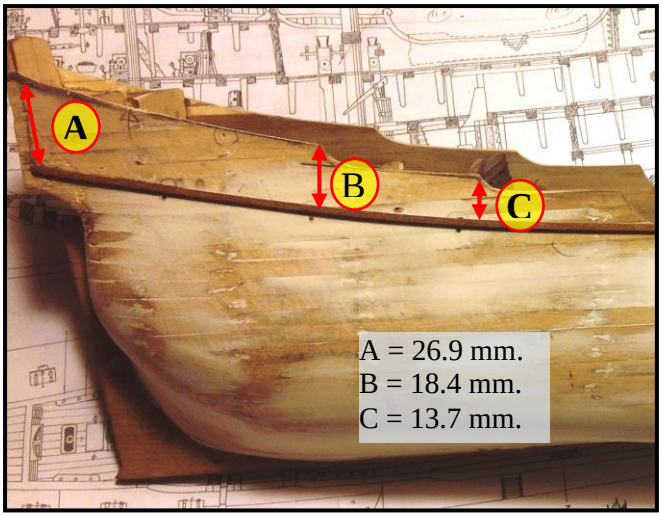
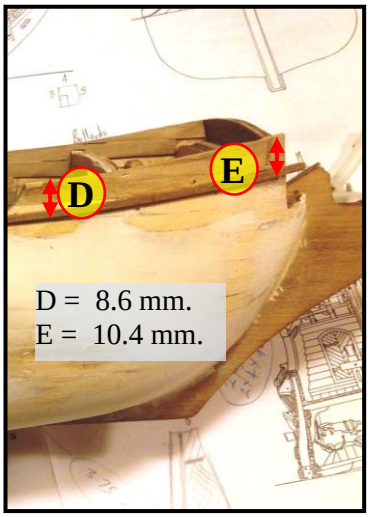



**Figure 25: Wale 1**

This wale was then the starting point from which all other wales and planks were going to be added. Measurements were taken from Plan Sheet 1 in order to position accurately this wale.




Although not clear in Fig. 26, wale 1 was slightly excess in length over the central bulwark at each end and trimmed back later when the curved hance was added.

## Anchor Lining

To avoid damage to the hull whilst catting and fishing an anchor, planks of the same width as the ship's side were added with their thickness equal to the difference between the normal planking and the thickness of the wales. This produced a totally flush surface on the ship's side. If there were to be damage, then the extra planks could easily be replaced.

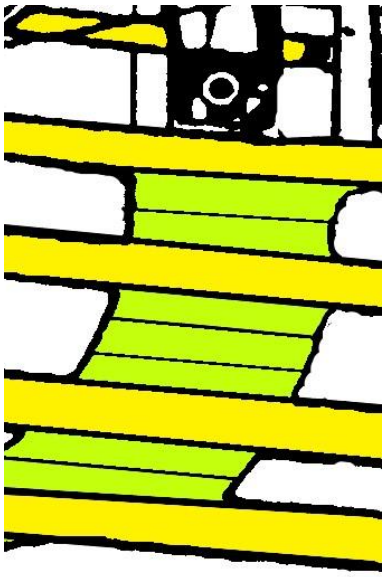


**Figure 26: Anchor Lining**

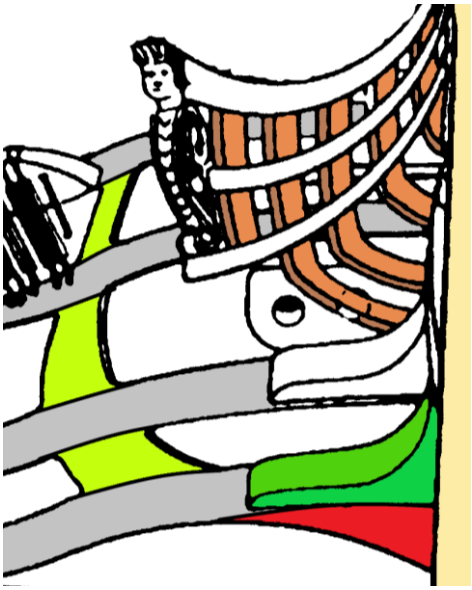


**Figure 27: Wash Cant vs Anchor Lining**

Drawings can be deceptive and Fig. 27 is no exception. At first glance, it appears that the anchor lining extends down below the lower cheek (green). That is not the case.

The wales (grey) that extend the length of the ship are there for strengthening purposes and so the width of that is consistent along the ship – some builders have incorrectly extended the wale portion that wraps around the bow to be part of the area under the lower cheek.

Neither the anchor lining or the wale timbers are to be found under the lower cheek.

What the drawing is depicting – I believe - is an incomplete illustration of the wash cant. The area shown in red signifies the area occupied by the wash cant against the hull surface.

# Hawser Holes

Since the placement of the rails is dependent on the individual builder's skills, the hawse holes *may not be positioned as indicated in Fig. 23.*

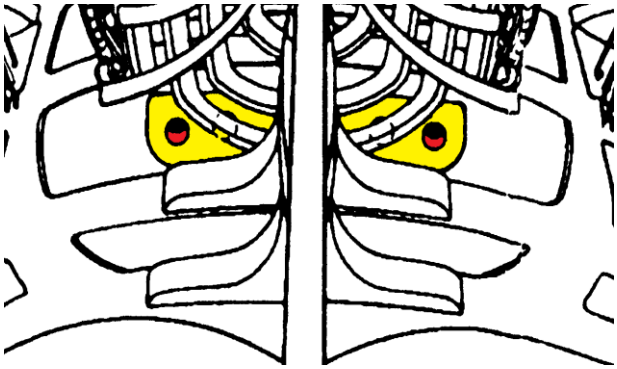


**Figure 28: Hawser Holes**

The lining timbers (yellow), could be made from the second planking material.

Immediately below the hawse hole is a bolster but this is not evident in the drawings. It was a carved block with a rounded edge to reduce excessive wear on the hemp anchor cable. That bolster, usually made from elm, would either run straight across under both holes or be carved to fit around the bottom half of both holes. In the majority of models seen, it is obvious that builders omit this important piece of construction.

In contrast, Fig. 30 (not from the Derfflinger) shows a common practice – hawse holes simply drilled through and left unfinished with rough edges.

The holes (in fact the bolsters) were radiused on both the inner and outer surfaces with a larger curve on the bottom half. This had the net result of reducing chafing of the ropes… something else to consider.

**Figure 29: Ruining the Image**

# CHAPTER 4: RAILS, TIMBERS, CHEEKS & CANTS

*This is one area of the ship build that can be extraordinarily complex or **easily simplified**. In this particular build, it was decided to explore a number of build options that many would ignore.*

The *knee of the head* is a continuation of the *stem* (stem post) and together they are termed the *beakhead*. It is a large flat piece of timber supporting the ornamentation placed underneath the bowsprit. Being extremely broad at the upper part, it is composed of many parts. It is secured to the bow of the ship with *cheeks of the head* (blue and green) which are horizontally mounted knees found at the lower end.

The ornamentation essentially consists of three *rails* (green, yellow and orange) extending from the hull to the fore part of the beakhead along with *head timbers* (brown) arranged vertically behind the rails. In many builds of this and other ships, the timbers are built from small sections added between the rails. To further complicate matters, four out of the five timbers are curved inwards.

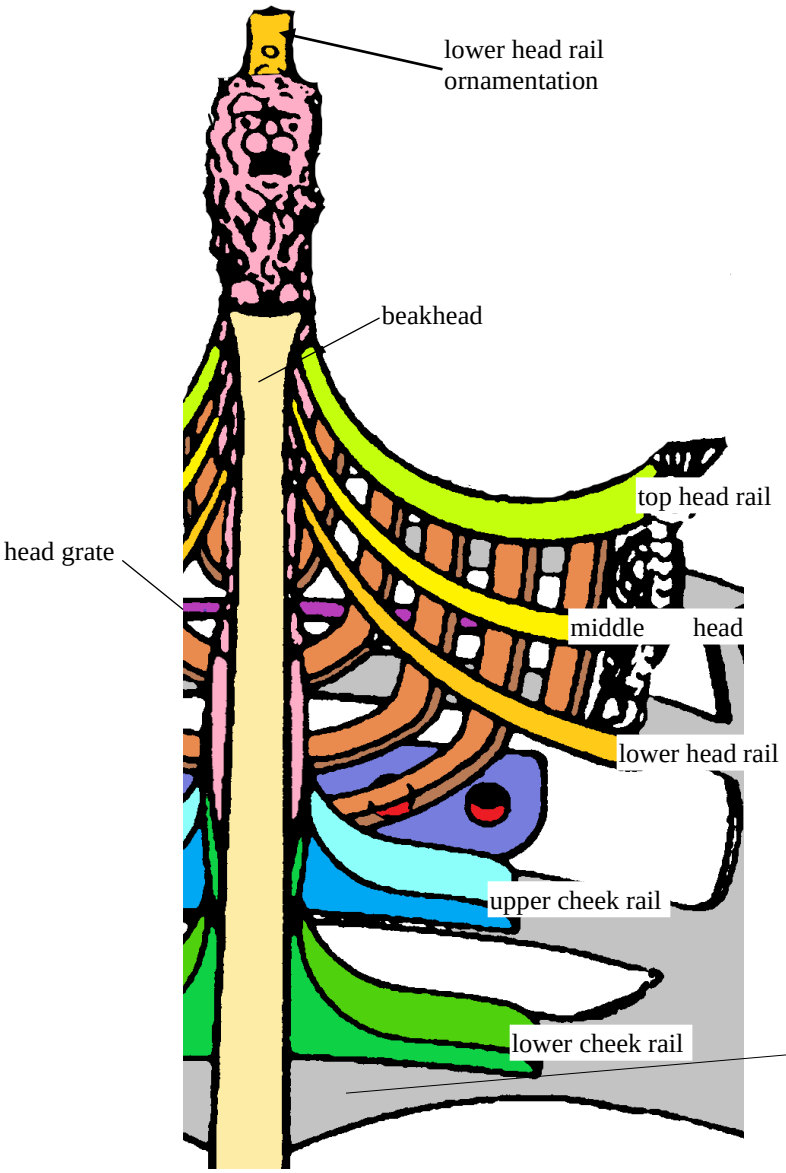



**Figure 30: Beakhead Ornamentation**

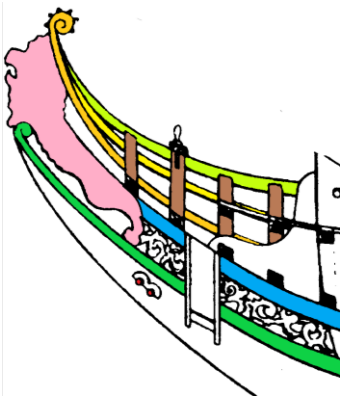


**Figure 31: Beakhead Ornamentation (port view)**

**Figure 32: Area Occupied by Wash Cant**

## Cheeks

The cheeks had a dual role – securing the knee of the head to the stem post as well as supporting the upright head timbers. The cheeks consisted of at least two timbers pieces – a curved knee section (shaded blue) underneath the hawser holes and a longitudinal section running forward along the knee of the head (refer to Fig. 34).

## Wash Cant

This feature – ***often not seen on builds*** - is designed to prevent the rising anchor from damaging the head timbers. The wash cant (red) is continuous with part of the curved section of the lower cheek (green).

The wash cant will need to be made over-size and then trimmed back to the shape required.

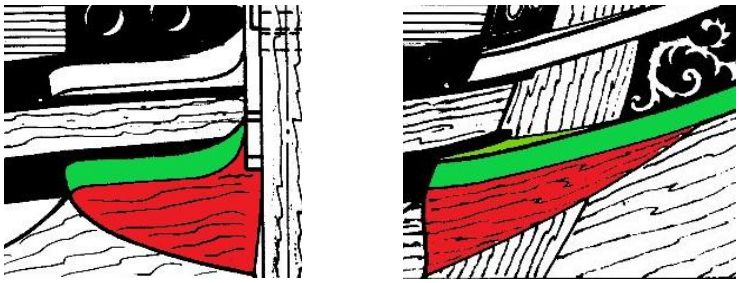


**Figure 33: Wash Cant (bow and starboard views - red)**

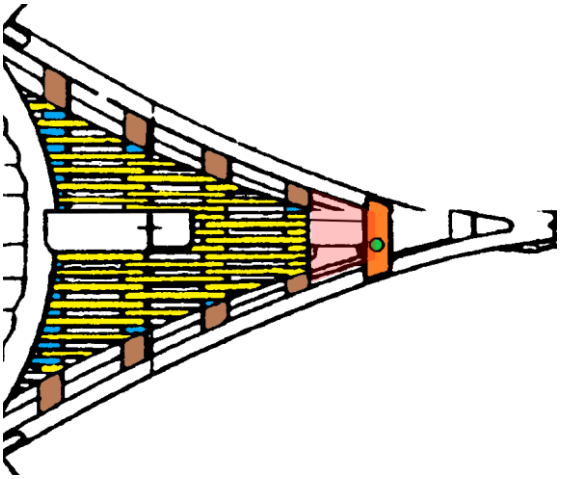


**Figure 34: Head Grate**

## Head Grate & Head Timbers

This one structure is poorly understood but it is an essential work surface. The grate consists of a series of short thin planks (yellow) laid from fore to stern and supported by horizontal head timbers/ beams (blue). Forward of the grate area there is an open space (pink) that allows the gammoning from the bowsprit to extend down to each side of the lower part of the beakhead.

In cross-section, the upright head timbers (brown) will have curve inwards below the lower cheek rail towards the underlying knee of the head and are one continuous length fixed inside the three rails as shown in Fig. 36. However, the first and last head timbers (red broken lines) are not curved. The most forward timber is not shown at all. The reality is that many builders leave the timbers out altogether, give no attention to the curvature or just place small blocks between the rails rather than the full length of timber. It is here that some definite decisions need to be made.

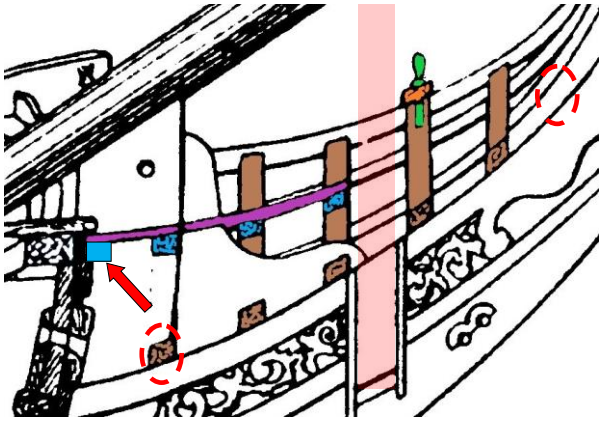


**Figure 35: Head Beams & Gammoning Space**

There appear to be four grate supporting beams (blue) – three beams are shown in Fig. 29 with a fourth superimposed and shown with a red arrow. Fig. 36 indicates that fourth beam adjacent to the hull surface beneath the prow deck margin plank.

The two belaying pins (green) – only one is visible - are shown in plan sheet 7.

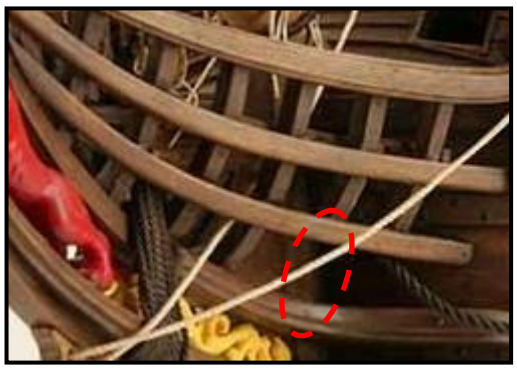


**Figure 36: Timber Head Variation**

In this Derfflinger build, the second to aft vertical head timber (broken red circle) has *not* been extended down to the upper cheek rail (refer back to the text on the previous page). Just another variation.

In Fig. 38, the grate-supporting *horizontal* head timbers can be seen underneath the grate strips. Note that no space has been allowed for the gammoning.

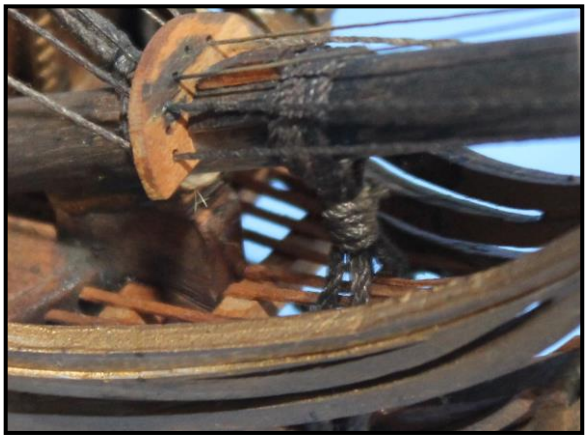


**Figure 37: Head Grate and Supporting Beams**

**Figure 38: Head Grate Hidden**

The grate is often not visible from a side view (Fig. 39) since it is partly obscured by a head rail. This is clearly shown (purple) back in Fig. 36.

This particular build shows a number of ***omissions, simplifications and errors*** and it is left to the reader – having read the previous text - to pick these out.

The manufacturer of this kit has supplied metal ornamentations including the head rails and that makes the build a little easier.

**Figure 39: A Derfflinger Build**